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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/960,713	09/21/2001	Alan Lee Taylor	40921/261784	4278

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Daniel Daniels & Verdonik, P.A.
P.O. Drawer 12218
Research Triangle Park, NC 27709

EXAMINER

NGUYEN, CINDY

ART UNIT	PAPER NUMBER
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2171

DATE MAILED: 02/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/960,713

Applicant(s)

TAYLOR ET AL.

Examiner

Cindy Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 September 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 September 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This is in response to application filed on 09/21/2001 in which claims 1-21 are presented for examination.

1. Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-7 and 9-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Ofek (U.S. 6044444).

Regarding claim 1, Ofek discloses: a method for synchronizing a plurality of data images in a compute system, the plurality of data images including a primary image and at least one secondary image, the method comprising:

receiving a write request from a host computer at a primary image site and at a secondary image site (col. 18, lines 12-47, Ofek);

writing to the primary image at the primary image site and attempting to write to the at least one secondary lineage at the at least one secondary image site (col. 24, lines 53-63, Ofek); and

in the event the write attempt to the at least one secondary image falls, creating a fracture log at the primary image site which is representative of changed regions in the primary image at the primary image site, whereby the log can be used to synchronize the primary image and the secondary image (col. 24, lines 53 to col. 25, lines 33, Ofek).

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Regarding claim 12, Ofek discloses: a computer system for maintaining a plurality of data images in the computer system, the plurality of data images including a primary image and at least one secondary image, the computer system comprising: non-volatile storage for storing at least the primary image (col. 9, lines 42-57, Ofek); a network interface for accessing the at least one secondary image (col. 11, lines 55 to col. 12, lines 5, Ofek);

Logic for creating a fracture log which identifies changed regions in the primary image effected as a result of a write to the primary image, and for creating the fracture log only if a write request to a primary image and at least one secondary image fails with respect to the secondary image failure (col. 24, lines 53 to col. 25, lines 33, Ofek);

write logic for writing to the primary image and to the at least one secondary image to maintain the primary image and the at least one secondary image synchronized, and for writing to the at least one secondary image based on the contents of the fracture log upon the failure of a write request to the at least one secondary image (col. 26, lines 54 to col. 27, lines 20, Ofek).

Regarding claims 2 and 13, all the limitations of these claims have been noted in the rejection of claims 1 and 12 above, respectively. In addition, Ofek discloses: wherein said fracture log comprises a bitmap identifying the changed regions on at least one disk that has been written to (col. 17, lines 21-45, Ofek).

Regarding claim 3, all the limitations of this claim have been noted in the rejection of claim 1 above. In addition, Ofek discloses: conducted in synchronous mirroring operations (col. 21, lines 27-43, Ofek).

Regarding claim 4, all the limitations of this claim have been noted in the rejection of claim 1 above. In addition, Ofek discloses: further comprising simultaneously updating the primary image at the

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primary image site and the at least one secondary image at the at least one secondary image site in response to a write request, and communicating to the host that the update to the primary image at the primary image site and the at least one secondary image at the at least one secondary image site is complete, whereby the fracture log is not created (col. 17, lines 20-45, Ofek).

Regarding claim 5, all the limitations of this claim have been noted in the rejection of claim 1 above. In addition, Ofek discloses: wherein: the write request to the at least one secondary image site fails (col. 24, lines 25-63, Ofek); the fracture log representative of changed regions is created at the primary image site and is representative of changed regions in the image at the primary image site; and the fracture log at the primary image site is used to effect writing to the at least one secondary image at the at least one secondary image site when it becomes possible to write to the at least one secondary image site, to ensure that the images at the primary image site and at the at least one secondary image site are synchronized (col. 26, lines 29 to col. 27, lines 20, Ofek).

Regarding claims 6 and 16, all the limitations of these claims have been noted in the rejection of claims 1 and 12 above, respectively. In addition, Ofek discloses: further comprising erasing the fracture log once writing to the at least one secondary image occurs (col. 33, lines 65 to col. 34, lines 3, Ofek).

Regarding claim 14, all the limitations of this claim have been noted in the rejection of claim 12 above. In addition, Ofek discloses: wherein said logic for creating a fracture log is located at a primary image site in which the primary image is maintained, and said write logic is configured for updating the primary image at the primary image site and the at least one secondary image at least one secondary image site, and for communicating to a host issuing the

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write request that the update to the primary image at the primary image site, and the at least one secondary image at the at least one secondary image site is complete (col. 17, lines 20-45, Ofek).

Regarding claims 7 and 17, all the limitations of these claims have been noted in the rejection of claims 5 and 14 above, respectively. In addition, Ofek discloses: further comprising erasing the fracture log once writing to the primary image and to the at least one secondary image occurs (col. 34, lines 4-24, Ofek).

Regarding claims 9 and 19, all the limitations of these claims have been noted in the rejection of claims 1 and 12 above, respectively. In addition, Ofek discloses: wherein said primary image site and said secondary image site comprise storage arrays (col. 11, lines 27-44, Ofek).

Regarding claims 10 and 20, all the limitations of these claims have been noted in the rejection of claims 1 and 12 above, respectively. In addition, Ofek discloses: wherein said host computer is a server (col. 7, lines 17-37, Ofek), connected through a network comprising a plurality of storage arrays comprised of multiple storage disks, for controlling the operation of the storage arrays (col. 11, lines 27-44, Ofek).

Regarding claims 11 and 21, all the limitations of these claims have been noted in the rejection of claims 1 and 12 above, respectively. In addition, Ofek discloses: wherein said synchronizing of data images at the primary image site and at the secondary image site is conducted to allow the computer system to operate in the event one of the primary image sites and the secondary image site falls (col. 26, lines 54 to col. 27, lines 5, Ofek).

Regarding claim 15, all the limitations of this claim have been noted in the rejection of claim 12 above. In addition, Ofek discloses: wherein the write logic is configured for using a

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created fracture log, in the event of a failure upon a write request to write to the at least one secondary image, to write the same changes to the at least one secondary image upon the ability to write being restored, as previously written to the primary image to ensure synchronization between the primary image and the at least one secondary image (col. 22, lines 59 to col. 23, lines 19, Ofek).

Regarding claim 18, all the limitations of this claim have been noted in the rejection of claim 14 above. In addition, Ofek discloses: further comprising: a write intent log in the primary image for identifying regions in the primary image possibly affected by a write request irrespective of whether there was a possible failure to write to the primary image in response to a write request (col. 34, lines 25-59, Ofek); and said write logic further configured for writing to the secondary image the blocks in the primary image identified by the write intent log as possibly being affected upon the ability to write to the primary image being restored to normal operation (col. 30, lines 65 to col. 31, lines 9, Ofek).

3. *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek (U.S. 6044444) in view of Yanai et al. (U.S. 5742792) (Yanai).

Regarding claim 8, all the limitations of this claim have been noted in the rejection of claim 4 above. However, Ofek didn't disclose: wherein the write request falls at the primary

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image site, and further comprising creating a write intent log which identifies blocks at the primary image site to which writing may have occurred, for writing of the identified blocks. to at least one secondary image, when writing to the primary image site is restored, and in the event writing to the at least one secondary image is not possible, for creating said fracture log at the primary image site for effecting said write request on the at least one secondary image when writing to the at least one secondary image is restored. On the other hand, Yanai discloses: wherein the write request falls at the primary image site, and further comprising creating a write intent log which identifies blocks at the primary image site to which writing may have occurred, for writing of the identified blocks to at least one secondary image, when writing to the primary image site is restored, and in the event writing to the at least one secondary image is not possible, for creating said fracture log at the primary image site for effecting said write request on the at least one secondary image when writing to the at least one secondary image is restored (col. 32, lines 16-63, Yanai). Thus, at the time invention was made, it would have been obvious to a person of ordinary skill in the art to include the step for creating a write intent log as above in the system of Ofek as taught by Yanai. The motivation being to enable the system performed the recovery from the site failure and the two data storage systems automatically resynchronize (col. 32, lines 16-63, Yanai).

5. *Conclusion*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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McDowell (U.S 6260125) Asynchronous write queues, reconstruction and check pointing in disk erroring applications.

Davis et al. (U.S 5546536). Log for selective management of specific address in a shadow storage system.

Ludlam et al. (U.S 5459857). Fault tolerant disk array data storage subsystem.

Yanai et al. (U.S 6173377). Remote data mirroring.

Rastogi et al. (U.S 6205449). System and method for providing hot spare redundancy and recovery for a very large database management system.

6. Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cindy Nguyen whose telephone number is 703-305-4698. The examiner can normally be reached on M-F: 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Safet Metjahic can be reached on 703-308-1436. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

CN

Cindy Nguyen
February 21, 2004

Wayne
WAYNE AMSBURY
PRIMARY PATENT EXAMINER